

A microarray assay system using an array-of-arrays plate mounted on the top surface of a vacuum fixture, and an automatic handling system that handles the plate and fixture assembly. The A<sup>2</sup> plate includes a tray formed of a flexible material and a rigid frame for mounting on the fixture. The fixture has a plurality of orifices opening at the top surface and connected to a vacuum source to create a negative pressure to hold the flexible plate against the top surface of the fixture. The automatic handling systems that can be used with the plate and fixture assembly include a microarray printing machine, liquid handling robot, hybridization and incubation devices, and microarray imaging devices.